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CHARACTERISTICS OF PLUS JUNCTURE IN
JUXTAPOSITION WITH THE SEGMENTAL
PHONEMES OF ENGLISH: A SURVEY

by

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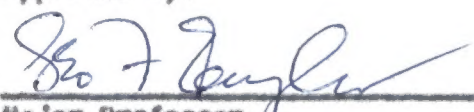
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CHAPTER I

INTRODUCTION

1.0 "Language is a system of arbitrarily chosen and arbitrarily organized sounds which serve its speakers as a means of communication."¹ For the purposes of this paper the concept "system" is of extreme relevance. In order to define "plus juncture" thenceforth symbolized /+/, to describe its function as a phenomenon of the English language, to list its identifying characteristics, i.e., to assign it its domain in the complex structural hierarchy which comprises the English language, it will be necessary to examine the structure of the English language. This examination will necessarily be cursory. The structural system of English, or indeed of any language, is so elaborate that a full and detailed treatment of it would fill many volumes.²

1.1 The basic elements of any language are its phones (speech sounds). Any descriptive examination of a language will begin at the phonetic level and proceed to the phonemic level. Phonemics is the branch of linguistics whose subject matter is the organization of phones into phonemes. The highly structured nature of language is evident even at its most basic levels: a phone is a unique minimal segment of the stream

¹Cynthia D. Buchanan, A Programmed Introduction to Linguistics: Phonetics and Phonemics (Boston, 1963), p. 9.

²W. Nelson Francis, The Structure of American English (New York, 1958), p. 224.

of speech;³ an allophone is a class of phones which is one of a group making up a phoneme;⁴ a phoneme is a group of allophones which are phonetically similar and either in complementary distribution or free variation and do not contrast in the same environment.⁵ Complementary distribution exists when there is no common environment, in which two or more linguistic entities appear;⁶ free variation exists when two or more linguistic entities may occupy the same environment without changing the meaning.⁷

1.2 One of the most useful tools used by the phonemicist to identify and organize phones into phonemes is articulatory phonetics.

Articulatory phonetics is the study of the production of speech sounds. The formation of individual speech sounds depends upon the more mobile organs of the vocal tract—the articulators (the tongue and lower lip), and the points of articulation (the teeth, upper lip, alveolar ridge, palate, velum, uvula and glottis).⁸ The segmental phonemes (phonemes which follow one another consecutively in the stream of speech) of English are:

³*Ibid.*, p. 594.

⁴*Ibid.*, p. 589.

⁵*Ibid.*, p. 594.

⁶*Ibid.*, p. 591.

⁷*Ibid.*, p. 592.

⁸Buchanan, p. 38.

a) 21 consonants /p b t d k g ǰ f v ɸ ʁ s z ʃ ʒ m n ɲ l r/

b) 9 vowels /i e æ ɪ ə a u o ʊ/

c) 3 semivowels /y w h/⁹

1.3 The identification of the segmental phonemes of English is only the tentative first step in the description of the language. An utterance will not necessarily be understandable even when its vowels and consonants have been recognized. More signals are necessary. Another phonemic level, phonemic because by functional definition a phoneme serves to distinguish utterances,¹⁰ is occupied by the suprasegmentals (also termed prosodics). Suprasegmentals are phonemes which are synchronous with one or more successive segmental phonemes.¹¹ The suprasegmentals of English are:

- a) 4 stresses: primary / ˈ /
secondary / ˌ /
tertiary / ˙ /
weak / ˘ /
- b) 4 pitches: low /1/
mid /2/
high /3/
extra high /4/
- c) 3 clause terminals: falling / ˩ /
rising / ˨˨˩ /
sustaining / ˩˩˩ /
- d) 1 open transition: /+/¹²

⁹cf. H. A. Gleason, An Introduction to Descriptive Linguistics, 2nd ed. (New York, 1961), p. 50.

¹⁰ibid., p. 42.

¹¹Francis, p. 596.

¹²Gleason, p. 50.

1.4 The second major level in the process of working from smaller to larger units of structure is morphemics. Morphemics is the branch of linguistics whose subject matter is the organization of phones into meaningful units of speech; i.e., the grammatical forms. A structural hierarchy analogous to that found in phonemics exists within morphemics. A morph (shape or form) is a combination of phones that has a meaning. A morpheme is a group of allomorphs that are semantically the same and in complementary distribution.¹³ The broadest and most comprehensive classes of morphemes in English are roots and affixes. The vast majority of English morphemes are roots: walk, talk, follow, shelf, rug, road. Such morphemes as -s, -ed, -ing, are affixes.¹⁴

1.5 The third major division of the structure of English is syntax, i.e., the description of larger combinations of morphemes involving as basic units the combinations described under the morphology of language.¹⁵

1.6 Some devices which English speakers make use of to build morphemes into larger organized combinations or structures are:

- a) Word Order—the linear or time sequence in which words appear in an utterance.
- b) Prosody—the over-all musical pattern of stress, pitch and juncture (the suprasegmentals) in which the words of an utterance are spoken.

¹³Francis, p. 173.

¹⁴Gleason, p. 58.

¹⁵Gleason, loc. cit.

- c) **Function Words**—words largely devoid of lexical meaning which are used to indicate various functional relationships among the lexical words of an utterance.
- d) **Inflections**—morphemic changes which adapt words to perform certain structural functions without changing their lexical meaning.
- e) **Derivational Contrast**—the contrast between words which have the same base but differ in the number and nature of their derivational affixes.¹⁶
- f) **Concord**—certain words are required to take forms which correspond in specified ways with certain other words. (Agreement of subject-verb.)¹⁷
- g) **Government**—certain inflectional forms are used primarily to signal the place of the word in a construction. (Case forms—pronouns.)¹⁷

1.7 It can be noted from the above list that morphology and syntax overlap. Gleason includes these two terms under the general heading of grammar with the following explanation: "The fixed order of morphemes in certain constructions, and the definable degree of freedom, are basic to language. They are expressions of the systematic structure which is the real essence of speech. It is the business of linguistic science to describe these principles of arrangement in the most comprehensive and concise way possible. Such a description is the 'grammar' of the language. Grammar has two subdivisions: morphology, the description of the more intimate combinations of morphemes, roughly what are familiarly called 'words'; and syntax (roughly, word

¹⁶Francis, p. 234.

¹⁷Gleason, p. 164.

order), the description of larger combinations of morphemes."¹⁸

1.8 Summary. In the preceding synopsis of the structure of English it is evident that /+/ appears initially under the general heading of phonemics and more specifically under the heading of suprasegmentals. Because a /+/ cannot be distinguished in isolation as can the vowels and consonants of English, it would not be identifiable as a segmental phoneme. On the other hand, /+/ can be identified within the linear sequence in which phonemes occur in an utterance. It can be described phonemically, as can the other forty-four phonemes of English, as a linguistic entity which serves to distinguish speech utterances. At the suprasegmental level /+/ operates in conjunction with both segmental phonemes and the other suprasegmentals (of stress, pitch, terminal juncture). It is obvious that /+/ operates in the areas of morphology and syntax because a morph, by definition, is composed of phonemes. It has been previously determined that morphology and syntax are structurally symbiotic. (1.7) It is interesting to note that a speaking knowledge of a language requires very close to one hundred per cent control of the phonology, fifty to ninety per cent of the grammar but perhaps less than one per cent of the vocabulary.¹⁹

1.9 Statement of Purpose. The purpose of this paper is to synthesize, organize, and formalize the characteristics of /+/ as they have been treated by Leonard Bloomfield, Cynthia Buchanan, W. Nelson Francis, H. A. Gleason, Jr., Ernest F. Haden, Archibald A. Hill, and Charles Francis Hockett.

¹⁸ibid., p. 57.

¹⁹ibid., p. 343.

CHAPTER 2

/+/ AS A PHENOMENON OF TRANSITION

2.0 It seems obvious to a native speaker of English that the words in an utterance "don't all run together." He has the intuitive feeling that an utterance is composed of different words which can easily be isolated from the whole. At least he has this feeling until he attempts to understand a spoken foreign language. If pressed for an empirical reason for this intuitive observation he would most likely state that there was a pause between words. In many instances he would be partially correct. The phenomenon of /+/ is, however, not that simple.

2.1 Leonard Bloomfield describes transition as "the manner in which the vocal organs pass from inactivity to the formation of a phoneme, or from the formation of one phoneme to that of the next, or from the formation of a phoneme to inactivity."²⁰ He further states that "in successions of consonants the chief transitional feature seems to be the difference between close and open transition. In English we use close transition. When we pass from one stop to another, we form the second closure before opening the first: in a word like actor [ɛktɔr], for instance, the tip of the tongue touches the gums for the [t] before the back of the tongue is removed from the velum to release the [k]. French uses open transition: in a word like acteur [ɛktœ:r] the [k]

²⁰ Leonard Bloomfield, Language (New York, 1933), p. 118.

is opened before the tongue-tip touches the teeth for the [t].²¹

2.2 More recent linguists, W. Nelson Francis, Cynthia Buchanan, Charles F. Hockett, Archibald A. Hill, and H. A. Gleason, Jr., while accepting Bloomfield's general statement of transition, disagree with his implication that open transition does not occur in the English language. The status of transition has been greatly expanded since Bloomfield's Language was published in 1933.

2.21 On the general subject of transition Francis states that "speech sounds...are not separate individual units, moving along like soldiers in a single file. They are joined together in a continuous flow, so that at the places where they join, the junctures, they often blur gradually one into another."²² He adds that "phonemicists have come to the conclusion that there are three significant types of joints or transitions between phonemes, one of which has three subtypes. These three are called respectively close juncture (or normal transition), open (or plus) juncture, and terminal juncture."²³

2.22 Buchanan is in agreement with Francis' inventory of transitions in the English language.²⁴

2.23 Hockett adds no new dimension to transition, but uses the term "muddy" transition rather than close juncture or normal transition and "sharp" transition rather than open juncture. He states that muddy transition within a macrosegment (the stretch of material spoken with

²¹ Ibid., p. 119.

²² Francis, p. 94.

²³ Ibid., p. 156.

²⁴ Buchanan, pp. 239-246.

a single intonation) is much more common than sharp transition.²⁵

2.23 Hill is also in basic agreement, differing only in terminology. When sounds are given without juncture, they are said to be in smooth transition, indicating the absence of juncture, or zero.²⁶

2.24 Gleason refers to terminal junctures as clause terminals.²⁷

2.3 /+/-/ is recognized as a phenomenon of transition in the English language. Francis defines /+/-/ as "a transition between segmental phonemes marked by retardation and (sometimes) slight pause."²⁸ He also makes a statement with which the author of this report is not in complete agreement: "/+/-/ is easy to recognize," as well as a statement with which the author is in complete agreement: "/+/-/ is difficult to describe."²⁹

2.31 Buchanan does not attempt a succinct definition of /+/-/ but states that "there is a supra-segmental phoneme present in the utterance night rate which is not present in the utterance nirate. This phoneme is called juncture and is represented by /+/-/."³⁰

2.32 Hockett gives the following general description of /+/-/: "There is a contrast between two different ways in which a speaker of English can get from one vowel or consonant to the next. Within a single macrosegment...one finds both sharp transition and another type, which

²⁵Charles F. Hockett, A Course in Linguistics (New York, 1958), p. 95.

²⁶Archibald A. Hill, Introduction to Linguistic Structures: From Sound to Sentence in English (New York, 1958), p. 25.

²⁷Gleason, p. 46.

²⁸Francis, p. 594.

²⁹Ibid., p. 156.

³⁰Buchanan, p. 594.

we may call 'muddy.' If one says The night rates are lower one almost always has sharp transition between the /t/ of night and the /r/ of rate. But in The nitrates are better the transition between the /t/ and the /r/ of nitrates is muddy. Our way of providing for this is to recognize sharp transition within a macrosegment as a phoneme. This phoneme will henceforth be represented by the mark /+/- and will be called juncture."³¹

2.32 Hill describes /+/- as a phenomenon of timing, giving the explanation that "in a pair like that stuff: that's tough the distinction is audible in terms of prolongation. In the first utterance, the j-sound which occurs before g is prolonged, in the second it is the g-sound."³²

2.33 Gleason emphasizes that /+/- is a feature of pronunciation and as such it varies from speaker to speaker and may even be inconsistently used by the same speaker.³³

2.4 It is evident from the above cautious attempts that formulating an elegant definition of /+/- is a difficult undertaking.

2.5 It must be emphasized that /+/- is a feature of spoken English only. It is an abstract entity used to describe something which occurs in the stream of speech—something whose signals the listener automatically understands.³⁴

³¹Hockett, p. 55.

³²Hill, p. 25.

³³Gleason, p. 43.

³⁴Ernest F. Haden, lecture delivered February 19, 1964, Kansas State University, Manhattan, Kansas.

2.6 It should also be kept in mind that /+/-/ is but one of four suprasegmentals whose specific domain is the junctural aspect of spoken English. The other three, briefly noted in 1.3, are: /↓/ a rapid trailing away of the voice into silence. Both the pitch and the volume decrease rapidly. /↑/ rising: a sudden, rapid, but short rise in pitch. The volume does not trail off so noticeably, but seems to be comparatively sharply cut off. /→/ sustaining: a sustention of the pitch accompanied by prolongation of the last syllable of the clause and some diminishing of volume.³⁵ These three suprasegmentals are called terminal junctures and are markedly different from /+/-/. The distinction lies in the term "terminal." Terminal junctures are popularly referred to as "pauses" and are a means of ending a clause. Gleason defines a clause as a unit in the spoken language, evident from the pronunciation only, characterized by the break at the end and the presence of a primary stress.³⁶ Francis uses an equivalent term "phrase" as "as much of an utterance as appears between two terminal junctures or between the beginning of an utterance and the first terminal juncture."³⁷ Hockett uses the term "macrosegment" and states that "each macrosegment ends with one of the three terminal contours /↑/, /↓/, or /→/, preceded by one of four pitch levels /1/, /2/, /3/, /4/."³⁸

³⁵Gleason, p. 43.

³⁶*Ibid.*, p. 46

³⁷Francis, p. 394.

³⁸Hockett, p. 39.

2.7 /+/-/ does not occur at the beginning of an utterance, at the end of an utterance or in any position occupied by the terminal junctures. It can be stated at this point that the privilege of occurrence of /+/-/ is only within a clause.

2.8 Summary. Thus far it has been determined that /+/-/ is a suprasegmental phoneme in the English language, that it operates in the general area of transition and that it can occur somewhere within the matrix of a clause.

CHAPTER 3

/ɪ/ AND ARTICULATORY PHONETICS

3.0 "Mairseydoats and dozeydoats and little lambsaidivy/ a kiddie eedivy too, wouldn't you?" With shifts in /ɪ/ the lyrics of this popular song of the forties would, without too much difficulty, be translated by the native speaker of English into: "Mares eat oats and does eat oats and little lambs eat ivy; a kid will eat ivy too, wouldn't you?" A non-native speaker of English would be nonplused by such an utterance. /ɪ/ as a suprasegmental phoneme of English distinguishes utterances. What is it that the native speaker hears and interprets?

3.1 Gleason's insistence upon /ɪ/ being a feature of pronunciation gives the first clue.³⁹ In the contrast [night rate: nitrate], the phonetic translation is rendered: [najt- + reyt-: naystreyt]. A phonetic transcription symbolizes graphically an accurate description of the sounds produced in an utterance. A phonemic transcription is simpler; it symbolizes graphically only the phonemes distinguishable in an utterance. The phonemic transcription of night rate: nitrate is: /najt + reyt/: /naytreyt/. Phonemic transcription records only the functional differences among speech sounds (a difference in meaning). Phonetic transcription records as many differences in sound as it is possible to perceive. In dealing with the phonetic signals of /ɪ/ it will be necessary to introduce the classes of sounds in the English

³⁹Gleason, p. 43.

language. The phonetics of English has been analyzed in detail in various handbooks, and therefore, does not need new, extended analysis here.⁴⁰ The major classes of sounds that will be discussed in this report are: stops, fricatives, affricates, nasals, laterals and the semivowels.

3.2 Placing a speech sound into a class does not necessarily describe its production adequately. A prominent feature of the sounds of English is the voiced:voiceless contrast in the stops and fricatives. During the flow of speech the activity of the vocal bands is sometimes temporarily arrested while the organs of articulation continue to move. Cessation of vocal band activity during the process of articulation results in speech sounds which are voiceless. In English, for every voiced stop or fricative there is a corresponding voiceless stop or fricative. In other words, two sounds may share the same point and manner of articulation, the only contrast may be that of voice: voiceless.

3.3 A further phonetic feature of the stops of English is the aspirated:unaspirated and released:unreleased contrast. When a stop consonant is released, it is often accompanied by a puff of air which imparts a breathy quality to the sound. When accompanied by a strong puff of air the sound is said to be aspirated. Unaspirated sounds are

⁴⁰Gleason, "Articulatory Phonetics," Chapter 15. See also: Kenneth Lee Pike, Phonetics: A Critical Analysis of Phonetic Theory and a Technic for the Practical Description of Sounds. Ann Arbor, Mich.: University of Michigan Press, 1943, and John Samuel Kenyon, American Pronunciation. A Textbook of Phonetics for Students of English, 8th ed. Ann Arbor, Mich.: George Wahr, 1940.

not released with a puff of air. There are two stages in the production of a stop consonant: (1) Air Pressure builds up behind a closure in the vocal tract, (2) this confined air is released. The second stage is referred to as the release of the stop. If the organs of articulation are allowed to relax during the final stage, the confined air will not be released sharply, then the stop will not have its characteristic explosion of sound. A stop consonant produced in this manner is called unreleased. These unreleased sounds are still called stops because they are produced with complete closure. The diacritical marks used to symbolize these phenomena are: aspirated [^h], unaspirated [], and unreleased [-].

CHAPTER 4

/t/ AND THE POSITION OF OCCURRENCE INVENTORY
OF THE CONSONANTS OF ENGLISH

4.0 Perhaps the most useful tool the analyst has at his disposal to identify /t/ in any utterance of English is the position of occurrence inventory of consonants. Every variety of phone, i.e., every allophone of every phoneme, has a characteristic set of positions of occurrence. The position of occurrence of a sound refers to where it may occur in a syllable or word.

4.1 The following is a simplified inventory of the consonants of English and their distribution:⁴¹

4.1.1 Stops. /p b t d k g/

Voicless bilabial /p/

Distribution: Initial position - aspirated, pin
 Final position - aspirated, unaspirated, or
 unreleased, pop
 Syllable-initial before stressed vowels -
 aspirated, apart
 Syllable-initial before unstressed vowels -
 aspirated, happen
 After initial /s/ - unaspirated, spin
 Before another stop - unreleased, peeped

Voiced bilabial /b/

Distribution: Unaspirated in all positions in English. boy,
about, lab
 May be unreleased when final, umb
 May be unreleased when followed by another stop.
about

Voicless apico-alveolar /t/

Distribution: Initial position - aspirated, tin
 Final position - aspirated, unaspirated or
 unreleased, fat

⁴¹cf. Francis, pp. 73-89.

Syllable-initial before stressed vowels -
aspirated. attack
After initial /s/ - unaspirated. stop
In preconsonantal positions - unreleased. catch

Voiced apico-alveolar /d/

Distribution: Unaspirated in all positions in English. doll,
adore, had
May be unreleased when final. dead
May be unreleased when followed by another stop.
bedbug

Voiceless dorso-velar /k/

Distribution: Initial position - aspirated. king
Final position - aspirated, unaspirated or
unreleased. sake
After initial /s/ - unaspirated. skin
In preconsonantal positions - unreleased. tactic

Voiced dorso-velar /g/

Distribution: Unaspirated in all positions in English. go,
again, dog
May be unreleased when final. egg
May be unreleased when followed by another stop.
pigpen

4.12 Fricatives. /f v θ ð s z ʃ ʒ/

Voiceless labio-dental /f/

Distribution: All positions. fat, sofa, off

Voiced labio-dental /v/

Distribution: All positions. vat, even, have

Voiceless apico-dental /θ/

Distribution: All positions. thin, deathly, wrath

Voiced apico-dental /ð/

Distribution: All positions. then, either, bathe

Voiceless apico-alveolar sibilant /s/

Distribution: All positions. sit, assist, hiss

Voiced apico-alveolar sibilant /z/

Distribution: All positions. zoo, lazy, damn

Voiceless fronto-palatal sibilant /ʃ/

Distribution: All positions. shed, soon, hash

Voiced fronto-palatal sibilant /ʒ/

Distribution: Limited, borrowed from French. Jazz, pleasure,
prestige

4.13 Affricates. /tʃ dʒ/

Voiceless apico-alveolar /tʃ/

Distribution: All positions. church, pitcher, search

Voiced apico-alveolar /dʒ/

Distribution: All positions. judge, badges, range

4.14 Nasals. /m n ŋ/

Voiced bilabial /m/

Distribution: All positions. mat, dinner, man
May be syllabic. grab 'em

Voiced apico-alveolar /n/

Distribution: All positions. nat, land, fan
May be syllabic. hot n cold

Voiced dorso-velar /ŋ/

Distribution: Never initial.
Medially between vowels. singer
Medially before /k/. sinker
Medially before /g/. finger
Final position. song
May be syllabic. dog n cat

4.15 Laterals. /l ɫ ɭ/

Voiced apico-alveolar /l/

Distribution: Initial position. link
Between a voiced consonant and the following
vowel. black

Voiced apico-alveolar lateral with dorso-velar coarticulation [ɫ]

Distribution: Medial position after vowels. gulf
Final position after vowels. full
May be syllabic nucleus. bottle

4.16 Retroflex. /ɻ/

Voiced retroflex.

Distribution: All positions. red, brown, care

4.17 Semivowels. /w y h/

Voiced labiodental semivowel /w/

Distribution: All positions. wish, away, cow

Voiceless labiovelar semivowel w

Distribution: Initial position. which
Medial position. somewhat

Voiced fronto-palatal semivowel /y/

Distribution: Initial position. yield
Medial position. inure

Voiced glottal fricative /h/

Distribution: Initial position. hyen
Medial position. shand

4.2 /+/ As Signaled by Position of Occurrence: Stops. The

significance of position of occurrence as a signal of /+/ is evident in the voiceless stops. It is necessary at this point to reiterate that the identifiable characteristic of a phoneme is its function in distinguishing utterances. At the segmental phoneme level it is possible to classify /p/, /t/, and /k/ as phonemes because, in the same environment they distinguish utterances. For example, placing /p/ before pill (the environment) results in pill, placing /k/ before pill results in kill, and placing /t/ before pill results in fill.

Pill, kill, and fill are distinguishable morphemes, i.e., they have different meanings. The contrast that's fought that stuff may be used to illustrate how /+/ functions in distinguishing utterances and how these distinctions are signaled by pronunciation. The segmental phonemes in both forms are identical, yet the average native speaker of English will have no difficulty in distinguishing them. This difference can be described in terms of privilege of occurrence. The /t/ of fought is aspirated, as are all voiceless stops in initial position. (4.11) Thus it can be predicted that if a /+/ is present it must precede the /t/. This signal of /+/ may be stated: A consonant which is an aspirated voiceless stop and which occurs in initial position

may be preceded by /+/. This may be formulated:

$$4.21 \quad 1. /C^{[vs^-]} (IP) / > (+) / C^{[vs^-]} /$$

Other signals of /+/ can be identified in the same context. The phonetic transcription of that's tough: that stuff will be helpful in identifying another signal:

The final /t/ of $[ʃæt^-]$ is unreleased, thus /+/ can be predicted to occur after it. This may be stated: A consonant which is an unreleased voiceless stop and is in final position may be followed by /+/.

$$4.22 \quad /C^{[vs^-]} (FP) / > /C^{[vs^-]} (FP) / (+)$$

If a consonant which is an unaspirated voiceless stop occurs in word final position it may also be followed by /+/.

$$4.23 \quad /C^{[va]} (FP) / > /C^{[va]} (FP) / (+)$$

The /s/ of $[stəf]$ identifies another signal. After initial /s/, /t/ is unaspirated. This may be stated: A consonant which is an unaspirated stop and which follows initial /s/ will not be preceded or followed by /+/. If a /+/ occurs it will precede the /s/.

$$4.24 \quad /s(IP)C^{[va]} / > (+) / s(IP)C^{[va]} /$$

4.3 /+/ as Signaled by Position of Occurrence: Fricatives. Because the fricatives may occur in all positions and have no variants, phonetic signals of /+/ are not intrinsic in their utterance.

4.4 /+/ as Signaled by Position of Occurrence: Affricates. The affricates occur in all positions and have no variants, thus phonetic signals of /+/ are not intrinsic in their utterance.

4.5 /+/ as Signaled by Position of Occurrence: Nasals. /ŋ/ occurs

In final position, thus if /+/ occurs it must follow /ŋ/, e.g. sing.

4.51
$$\begin{array}{c} N/\eta/ \\ /C \quad (FP)/ > /C \quad (FP)/(+) \end{array}$$

4.6 /+/ as Signaled by Position of Occurrence: Laterals. /l/ occurs

In initial position thus if /+/ occurs it must precede /l/. like

4.61
$$\begin{array}{c} /l/ \\ /C \quad (FP)/ > /C \quad (FP)/(+) \end{array}$$

The allophone [ɫ] of /l/ occurs in final position thus if /+/ occurs it must follow [ɫ]. spell

4.62
$$\begin{array}{c} L [ɫ] \\ /C \quad (FP)/ > /C \quad (FP)/(+) \end{array}$$

4.7 /+/ as Signaled by Position of Occurrence: Semivowels: The

allophone [w] of /w/ occurs in initial position thus if /+/ occurs it must precede [w]. which

4.71
$$\begin{array}{c} [w] \\ /SV \quad (IP)/ > (+)/SV \quad (IP)/ \end{array}$$

/y/ occurs in initial position thus if a /+/ occurs it must precede

/y/. yield

4.72
$$\begin{array}{c} /y/ \\ /SV \quad (IP)/ > (+)/SV \quad (IP)/ \end{array}$$

/h/ occurs in initial position thus if a /+/ occurs it must precede

/h/. hymn

4.73
$$\begin{array}{c} /h/ \\ /SV \quad (IP)/ > (+)/SV \quad (IP)/ \end{array}$$

4.8 SUMMARY. /+/ may occur before any consonant which occurs in word initial position and after any consonant which occurs in word final

position. The implication of this observation might lead to the

conclusion that most of the traditionally defined words of an utterance are separated from their neighbors by a /+/.⁴² This is true. However

it should not be construed that /+/ is identical with the traditional

⁴²Gleason, p. 43.

word division of writing – the space between words. /+/ is a feature of the spoken language. Although /+/ will be found in many places where word divisions customarily occur, certain commonly written word divisions are almost never paralleled by /+/ in natural speech. For example, a board is written as two words, while aboard is written as one. But each of these utterances is pronounced the same—/ə'bo:rd/.⁴⁵

⁴⁵Buchanan, p. 245.

CHAPTER 5

/+/ AS SIGNALLED BY VOICING

5.0 As will become more evident /+/ may be signaled by a variety of phonetic factors. The quality of voicing may also identify /+/ in an utterance. In passing from an unvoiced stop to a voiced sound one may begin the voicing at the very moment of explosion, or the voicing may lag for an instant.⁴⁴ Hockett illustrates this phenomenon in the contrast sliness: mines. The /n/ of mines is accompanied by voicing which begins fairly weakly and increases (crescendo voicing); this is typical of a macrosegment-initial /n/ in a form like know do that and different from the fairly even voicing accompanying a medial /n/ as in mines. Thus sliness: mines would be transcribed /sli:ns + nəs / : /mɪ:ns 7əs /. This voicing difference is subtle and perhaps not always present. When it is present, we say that the crescendo characteristic of the voicing, of the /n/ of sliness is part of the juncture, not of the /n/ itself. Crescendo voicing may be symbolized [-c^v]; diminuendo voicing as [c^v -]. Segments bounded by [-] are in general isolable.⁴⁵ For purposes of identifying /+/ this may be stated: A consonant which is uttered with crescendo voicing may be preceded by /+/ and a consonant which is uttered with diminuendo voicing may be followed by /+/.

⁴⁴Bloomfield, p. 118.

⁴⁵Hockett, p. 168.

5.1

$$/C \begin{matrix} v \\ \text{---} \end{matrix} / > (+) /C \begin{matrix} v \\ \text{---} \end{matrix} /$$

5.2

$$/C \begin{matrix} v \\ \text{---} \end{matrix} / > /C \begin{matrix} v \\ \text{---} \end{matrix} / (+)$$

CHAPTER 6

/ɹ/ AS SIGNALLED BY TIMING

6.0 In general, /ɹ/ is characterized by the prolongation of a segmental phoneme in pre-junctural position and the shortening of a segmental phoneme in post-junctural position.⁴⁶ In pre-junctural position, continuant consonants (all the consonants which are not stops), vowels, and glides are lengthened. In the minimal pair right rate: Nye trait, the glide /y/ of Nye is lengthened. In an aim: a name, the /n/ of an is lengthened. In that stuff: that's tough, the /s/ in that's is lengthened. The signals of /ɹ/ may be stated: if a continuant consonant in pre-junctural position is lengthened a /ɹ/ may follow. ([:] equals lengthening).

6.1 /CC [:] (PreJ)/ > /CC [:] (PreJ)/ (ɹ)

If a vowel in pre-junctural position is lengthened a /ɹ/ may follow.

6.2 /V [:] (PreJ)/ > /V [:] (PreJ)/ (ɹ)

If a glide in pre-junctural position is lengthened a /ɹ/ may follow.

6.3 /G [:] (PreJ)/ > /G [:] (PreJ)/ (ɹ)

In post-junctural position continuant consonants, vowels and glides are shortened. Letting [.] equal shortening, the following formulae can be derived:

6.4 /CC [.] (PostJ)/ > (ɹ)/CC [.] (PostJ)/

6.5 /V [.] (PostJ)/ > (ɹ)/V [.] (PostJ)/

6.6 /G [.] (PostJ)/ > (ɹ)/G [.] (PostJ)/

⁴⁶Suchanan, p. 244.

6.7 Of the sources used in this paper, Hill made what is perhaps the broadest statement concerning /+/-/ when he described it as a phenomenon of timing of a half unit—"unit" being used in the sense of a period of time about equal to the length of one average sound.⁴⁷ The terminal junctures can be described—tentatively only, since the necessary instrumental measurements are not fully available—as prolongation equal to about the length of one average sound for />/, one and a half average sounds for /⁷/, and two sounds for />/. Hill notes that the formulation of junctures as time phenomena is due primarily to the investigations of Martin Joos, who has worked extensively with a relatively new instrument, the sound spectrograph.⁴⁸ A sound spectrograph is an instrument which measures the frequencies and relative amplitudes of a given sound. Hill's statement of /+/-/ does not negate the usefulness of the phonetic signals of /+/-/ which the author is attempting to catalogue. Rather it provides an acoustically oriented description. It can be formularized:

$$6.71 \quad /+/-/ = \frac{SP}{2}$$

⁴⁷Hill, p. 25.

⁴⁸Ibid., p. 24.

CHAPTER 7

/+/ AS SIGNALLED BY STRESS

7.0 Stress and /+/ are closely related and form a special system within the phonemic structure of the language. /+/ may occur between syllables with various combinations of the stress phonemes. A useful term for this co-relationship is "superfix," which Francis defines as "a morpheme whose allomorphs consist of stress phonemes with or without /+/.⁴⁰ A superfix is a morpheme because stresses are phonemes and sequences of phonemes associated with a meaning are allomorphs. For example, the contrast suspect: suspect are composed of identical segmental phonemes, the only distinction is in the superfix. { ' } indicates a verb class; { ' } indicates a noun class. /+/ may be an allomorph in a superfix. For example in the contrast black bird: blackbird, the superfix { ' } indicates a bird which is black; { ' } indicates a species of bird.⁵⁰

7.1 The distribution of /+/ may be described in terms of stress. When two successive (not necessarily adjacent) vowels within a macrosegment both bear primary stress, there is always a /+/ somewhere between them. For example: free-Danny: free-Annie; see-table: see-table.

7.11 /-VCV-/ > /-V/(+)/CV-/

7.12 /-VCV-/ > /-VC/(+)/V-/

If the two stressed vowels are adjacent (no intervening consonant) then

⁴⁰Francis, p. 506.

⁵⁰Oleason, p. 45.

no contrast is possible and /+/ is always present. For example:

see eight.

7.13 $/-\acute{V}-/ > /-\acute{V}/(+)/\acute{V}-/$

When a stressed vowel is preceded by one or more consonants, it is clear whether the last consonant in the sequence goes with the stressed vowel or is separated from it by a /+/. It is not necessary that the next preceding vowel also bear primary stress. For example:

It + sprays: It's praise.

7.14 $/-\acute{V}CV-/ > /-\acute{V}C/(+)/\acute{V}-/$

7.15 $/-\acute{V}CV-/ > /-\acute{V}/(+)/CV-/$

Between an unstressed vowel and a following consonant /+/ does not occur. For example: aboard or aboard.

7.16 $/\acute{V}C-/ > /-\acute{V}C-/$

If there are no intervening consonants between successive unstressed vowels a /+/ will occur. For example: The Ides March are.

7.17 $/-\acute{W}-/ > /-\acute{V}/(+)/\acute{V}-/$

Secondary stress seems to work like primary stress as a conditioning factor for the occurrence of /+/. (7.12) tin + tin

7.18 $/-\acute{W}-/ > /-\acute{V}/(+)/\acute{V}-/$

However, if one of two vowels bear secondary stress and the other primary, then it is possible to have no intervening /+/. syntax⁵¹

7.19 $/-\acute{W}-/ > /-\acute{W}-/$

⁵¹Hockett, pp. 54-58.

CHAPTER 8

/+/ AS SIGNALLED BY PHONOTACTICS

8.0 The area of phonology which covers the structural characteristics of sequences of sounds is called phonotactics. The structure of English does not permit certain consonant clusters to occur. For example, the cluster /tk/ never occurs. Thus, if a word ends in /t/ and the next word begins with /k/ these two consonants will be separated by /+/. Two or more continuant consonants in close juncture make up a consonant cluster. When /+/ occurs between two contiguous consonants, they do not constitute a cluster. The area of phonotactics is too complex to be treated in detail in this paper. The major implication to be derived from the study of consonant clusters is that junctures are particularly likely to occur at points of normal syllable division.

8.1 There are three types of consonant clusters in the English language: (1) Initial, (2) Final, and (3) Medial.

8.1.1 Initial Consonant Clusters. Initial consonant clusters are postjunctural and prevocalic. In this position the largest number of consonants which can occur is three. The rules for initial clusters, generally stated, are the following: position 1 includes spirants, position 2 sounds with oral closure (stops and nasals), position 3 linguists and semivowels. All clusters follow the order 1-2-3, though not all positions have to be filled. Paired consonants cannot cluster if they differ in voice quality. Stops and spirants are arranged in voiced and voiceless pairs, while nasals, linguists, and semivowels are

not. /t/ may not occur within an initial consonant cluster but may precede it.

8.111 /ICC/ (+)/ICC/

8.2 Final Consonant Clusters. Final consonant clusters are postvocalic and prejunctural. The major types of final clusters are: 1-2 as in lip, 1-2-3 as in lips, 3-2-1 as in words, 3-2-1-1# as in glimped, 3#-3-2-1 as in worlds plus their variants. /t/ may not occur within a final consonant cluster but may follow it.

8.23 /FCC/ /FCC/ (+)

8.3 Medial Clusters. Medial clusters are defined as intervocalic clusters not immediately preceded or followed by a juncture and not interrupted by one. Juncture produces syllable division in medial clusters, and some types of syllable division do not occur without it. Others, however, occur with or without a juncture. Thus the sequence doctor, /dɒk.tər/ will always be divided between the /k/ and /t/ when there is no juncture. It will be divided in the same way with a juncture in that position /dɒk.tər/. If the sequence should represent the phrase docked at, however, syllable division after the /t/ could be accomplished only by a juncture, /dɒk.tər/. One large group of clusters can be characterized as /-VC+CV-/. If the juncture is lost in any such situation the two consonants then become a true medial cluster, regardless of any morphological boundaries or of syllable division. The limitations on clusters of the type /-VCCV-/ are essentially limitations on the loss of juncture between consonants. These limitations can be stated: Juncture is not lost between

identical consonants, that is, a sequence like /p + p/ in stop payment does not become a true cluster.

$$8.31 \quad \begin{array}{ccccc} /xl/ & /xl/ & & /xl/ & /xl/ \\ /C & C & / > & /C & /(+)/C \end{array}$$

A juncture is not lost between paired consonants if they differ in voice quality, so that /p + b/, as in stop Bill or /b + p/, as in Bob Peck, do not become a cluster.

$$8.32 \quad \begin{array}{ccccc} [V\text{-less}] & [V] & & [V\text{-less}] & [V] \\ /C & C & / > & /C & /(+)/C \end{array}$$

$$8.33 \quad \begin{array}{ccccc} [V/V\text{-less}] & & & [V] & [V\text{-less}] \\ /C C & & / > & /C & /(+)/C \end{array}$$

Juncture is preserved between a nasal and a stop of differing order, as in Tom Carter, /m:k/ and Jack Mayers /k:m/.

$$8.34 \quad \begin{array}{ccccc} N & S & & N & S \\ /C C & / > & /C & /(+)/C \end{array}$$

$$8.35 \quad \begin{array}{ccccc} S & N & & S & N \\ /C C & / > & /C & /(+)/C \end{array}$$

Juncture may be preserved between differing nasals, as in damnation, /m:n/.

$$8.36 \quad \begin{array}{ccccc} N(1,2,3) & N(1,2,3) & & N(1,2,3) & N(1,2,3) \\ /C & C & / > & /C & /(+)/C \end{array}$$

A frequent medial cluster is a final cluster before a following initial cluster, as in workplan, in which there is first a final cluster of a 3-2 type and then an initial cluster of a 3-3 type. Whenever a reversed cluster is followed by an initial cluster, a juncture is required between any two consonants of the same positional group.

$$8.37 \quad /3-2-2-3/ > /3-2/(+)/2-3/$$

Situations may occur when there is an overlap of consonant clusters, such as ink-spreader: 3-2-1-1-2-3. With clusters of this type it is possible to predict the occurrence of /+/ only in part. /+/ must occur in such sequences, but its location may be either before or after

the overlapping consonant. Initial clusters tend to take precedence over final ones.⁵²

8.38

/ʃ-ʒ-^ll-ʒ-ʒ/ > (probable) /ʃ-ʒ-^l /l+l/2-ʒ/.

⁵²Hill, pp. 70-88.

CHAPTER 9

SUMMARY OF FINDINGS

9.0 Formulas: Signals of /+/.

/+/ As Signaled by the Position of Occurrence Inventory

9.1 /C ^[vs^c] (IP)/ > (+)/C ^[vs^c] (IP)/ (4.21) pan (+) [p^cæn] ,

tan (+) [t^cæn] , can (+) [k^cæn] .

9.2 /C ^[vs⁻] (FP)/ > /C ^[vs⁻] (FP)/(+) (4.22) tap [t^cæp] (+) ,

cat [k^cæt] (+) , pack [p^cæk] (+) .

9.3 /C ^[vs] (FP)/ > /C ^[vs] (FP)/(+) (4.23) cap [k^cæp] (+) ,

sat [sæt] (+) , jack [t^cæk] (+) .

9.4 /s(IP)C ^[vs] / > (+)/s(IP)C ^[vs] / (4.24) spin (+) [spɪn] ,

stem (+) [stɛm] , skin (+) [skɪn] .

9.5 /C ^{N/ɪ/} (FP)/ > /C ^{N/ɪ/} (FP)/(+) (4.51) sing /sɪŋ (+)/ .

9.6 /C ^{L/ɪ/} (IP)/ > (+)/C ^{L/ɪ/} (IP)/ (4.61) like /(+)/aɪk/ .

9.7 /C ^{L[+]} (FP)/ > /C ^{L[+]} (FP)/(+) (4.62) spell [spɛl] (+) .

9.8 /SV ^{/w/ [w]} (IP)/ > (+)/SV ^{/w/ [w]} (IP)/ (4.71) wheel

(+) [wi:l] .

9.9 /SV ^{/y/} (IP)/ > (+)/SV ^{/y/} (IP) (4.72) yield /(+)/ɪjɪld/ .

9.10 /SV ^{/h/} (IP)/ > (+)/SV ^{/h/} (IP) (4.73) hymn /(+)/hɪm/ .

/+/ as Signaled by Voicing

9.11 /C ^[-] / > (+)/C ^[-] / (5.1) n of sliness /sɪŋ (+) ^[-] nɔs /:

n of minus /maɪnɔs/ .

9.12 /C ^[-] / > /C ^[-] / (+) (5.2) n of I'm always /ɪz m⁻ (+)

ɔlweɪz /: n of I mauled /ɔl mɔld/ .

/+/ As Signaled by Timing

- 9.13 /CC [ɪ] (PreJ)/ \rightarrow /CC [ɪ] (PreJ)/(+) (6.1) n of an ain
 /ə n [ɪ] (+) eɪ m /: n of a name /ə (+) neɪ m /.
- 9.14 /V [ɪ] (PreJ)/ \rightarrow /V [ɪ] (PreJ)/(+) (6.2) a cur / ɔ : (+)
 kər /: occur /ə kər /.
- 9.15 /G [ɪ] (PreJ)/ \rightarrow /G [ɪ] (PreJ)/(+) (6.3) see me
 /si y [ɪ] (+) mi y /: seamy / si y mi y /.
- 9.16 /CC [ɪ] (PostJ)/ \rightarrow (+)/CC [ɪ] (PostJ)/ (6.4) a nice man
 /ə (+) n [ɪ] əys + mæn / an ice man / əɪ (+) əys + mæn /.
- 9.17 /V [ɪ] (PostJ)/ \rightarrow (+)/V [ɪ] (PostJ)/ (6.5) at all
 /ə t (+) ɔ t [ɪ] /: a tall /ə (+) tɔ l /.
- 9.18 /G [ɪ] (PostJ)/ \rightarrow (+)/G [ɪ] (PostJ)/ (6.6) the east / ðə (+)
 i ɛst /: the yeast / ðə (+) ji yst /.
- 9.19 /+/ = $\frac{SP}{2}$ (6.71) The sons raise meat.
 /ðə + sɔnz \rightarrow reɪz + mi y tɪ /
The sons raise meat?
 /ðə + sɔnz \rightarrow reɪz + mi y tɪ /
The sun's rays meet.
 /ðə + sɔnz + reɪz \rightarrow mi y tɪ /

/+/ = 1/2 the length of time it takes to utter one segmental phoneme; /→/ = the length of time it takes to utter one SP, /⁻/ = 1 1/2 time length of time it takes to utter one SP, and />/ = 2 times the length of time it takes to utter one SP.

/+/ as Signaled by Stress

- 9.20 /-VCV-/ > /-VC/(+)/C-/ (7.11) free Denny /fríy (+) dəníy /.
- 9.21 /-VCV-/ > /-VC/(+)/V-/ (7.12) freed Annle /fríyd (+) dəníy /.
- 9.22 /-VV-/ > /-V/(+)/V-/ (7.13) see eight /sey (+) eíy t /.
- 9.23 /-VCV-/ > /-VC/(+)/V-/ (7.14) it sprays /ít (+) spríeyz /.
- 9.24 /-VCV-/ > /-V/(+)/CV-/ (7.15) its praise /íts (+) préy z /.
- 9.25 /VC-/ > /VC-/ (7.16) aboard /əbóurd / or a board /əbóurd /.
- 9.26 /-VV-/ > /-V/(+)/V-/ (7.17) idea alarm /aídyə (+) əlarmz /.
- 9.27 /-VV-/ > /-V/(+)/V-/ (7.18) tin tax /tín (+) tæks /.
- 9.28 /-VV-/ > /-VV-/ (7.19) syntax /sɪntæks /.

/+/ as Signaled by Phonotactics

- 9.29 /ICC/ > (+)/ICC/ (8.111) splash /sp/ -, spray /spr-/, spew /spy -, stupid /sty -, asclerotic /sk/ -, screen /skr -, skewer /sky -, squirt /sk -, soon /sp -, stone /st -, school /sk -/ and others.
- 9.30 /FCC/ > /FCC/(+) (8.23) aff /-ft/, bereaved /-vd/, steps /-sp s/, words /-rds/ and others.
- 9.31 /C^{X₁} C^{X₁}/ > /C^{X₁} /(+)/C^{X₁}/ (8.31) p and p of stop payment /stap (+) peíymənt/.
- 9.32 /C^[V-less] C^[V]/ > /C^[V-less] /(+)/C^[V]/ (8.32) p and b of stop bill /stap (+) bíl/.

- 9.33 $\boxed{V} \boxed{V-loss} /C \ C / \Rightarrow /C \ /(+)/C /$ (9.33) b and p of Bob Pack / bəb (+) pek /.
- 9.34 $\boxed{N} \boxed{S} /C \ C / \Rightarrow /C \ /(+)/C /$ (9.34) m and g of Tom Carter / 7æm (+) kærtər /.
- 9.35 $\boxed{S} \boxed{N} /C \ C / \Rightarrow /C \ /(+)/C /$ (9.35) k and m of Jack Meyers / jæk (+) mejəz /.
- 9.36 $\boxed{N(1,2,3)} \boxed{N(1,2,3)} /C \ C / \Rightarrow /C \ /(+)/C /$ (9.36) n and n of duration / dʌrən (+) neɪʃən /.
- 9.37 /3-2-2-3/ /3-2/(+)/2-3-/ (9.37) r, k, p and l of workplan /wɜrk (+) plæn /.
- 9.38 /3-2-1-2-3/ (probable) /3-2-1/(+)/2-3/ (9.38) n, k, s, p and g of Interreader /ɪŋk (+) spredər /.

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**CHARACTERISTICS OF PLUS JUNCTURE IN
JUXTAPOSITION WITH THE SEGMENTAL
PHONEMES OF ENGLISH: A SURVEY**

by

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ABSTRACT

Purpose: Although there is a great deal of extant literature on the suprasegmental plus juncture (/+/), it is atomistic. The purpose of this report was to survey a selected collection of the literature in the field of linguistics and to synthesize, organize and formularize the characteristics of /+/ as described by Leonard Bloomfield, Cynthia Buchanan, W. Nelson Francis, H. A. Gleason, Jr., Archibald A. Hill and Charles Francis Hockett.

Procedure: Characteristics of /+/ were examined from the following points of view: /+/ as a phenomenon of transition, /+/ as an identifiable entity of articulatory phonetics, /+/ as signaled by the position of occurrence inventory of the consonants of English, /+/ as signaled by voicing, /+/ as signaled by timing, /+/ as signaled by stress, and /+/ as signaled by phonotactics.

Summary of Findings. From the data researched the author has derived thirty-eight formulae which may signal the presence of /+/ in an utterance. These include formulae indicating that: /+/ may be signaled by the aspiration, unaspiration, or unrelease of voiceless stops (9.1 - 9.4); /+/ may be signaled by the position of occurrence inventory of the consonants of English (9.5 - 9.10); /+/ may be signaled by diminuendo or crescendo voicing (9.11 - 9.12); /+/ may be signaled by the lengthening or shortening of continuant consonants, vowels, and glides (9.13 - 9.18); /+/ may be signaled by timing (9.19); /+/ may be signaled by stress (9.20 - 9.28); /+/ may be signaled by initial, final, and medial consonant clusters (9.29 - 9.33); /+/ may

be signaled by juxtaposition of nasals and stops (9.34 - 9.35); /+/ may be signaled by juxtaposition of nasals and other nasals (9.36); /+/ may be signaled by the separation of consonant clusters (9.37 - 9.38).